Benign Mutant Bacterium Holds Down Brown Spot

Brown spot disease on green beans can be prevented by—strangely enough—a mutant strain of the very bacterium that causes the disease.

ARS bacterial geneticist D. Kyle Willis at the University of Wisconsin in Madison created the mutant bacterial strain of *Pseudomonas syringae* by inactivating a specific gene on the bacterial chromosome. The resulting mutant lacks the ability to cause disease.

"Like its disease-producing parent, the mutant grows on healthy bean leaves. It just grows less well. And in bean field plots, it holds down the growth of its parent to match its own, resulting in fewer bacteria on the plants," says ARS chemist Christen D. Upper. He and Willis are in the ARS Plant Disease Resistance Unit.

Upper tested the mutant strain in field studies done at Madison in 1991, 1993, and 1994. The mutant reduced growth of its disease-causing parent by 98 percent, an amount that should make a significant reduction in the disease, he says.

Rain sets the stage for these bacteria to flourish. So slowing down the growth of bacteria is critical to prevent entire fields of snap beans from being rendered unmarketable by brown spot in an especially wet growing season.

While a few resistant bean varieties are available, they aren't totally reliable, says Upper.

The Wisconsin green bean crop is valued at between $30 and $50 million. In a typical year, growers in Wisconsin alone could lose about $1 million from acreage not harvested because of an outbreak of brown spot. Other states with sizable snap bean acreage include Oregon, Michigan, and Illinois.

It will take further exploration to determine whether this particular mutant can be used to mitigate the hazard of bacterial brown spot to snap beans.—By **Linda Cooke,** ARS.

Christen D. Upper and D. Kyle Willis are in the ARS-USDA Plant Disease Resistance Research Unit, University of Wisconsin, Madison, WI 53706; phone (608) 263-2092, fax (608) 264-5275. ◆